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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/018,755	04/30/2002	Rainer Perthold	33420.00.0001	4461

7590 11/29/2005  
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EXAMINER
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ETTEHADIEH, ASLAN

ART UNIT	PAPER NUMBER
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2637

DATE MAILED: 11/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/018,755	PERTHOLD ET AL.	
	Examiner	Art Unit	
	Aslan Ettehadieh	2637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 4/30/2002.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 - 13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 - 13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 April 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Drawings***

The drawings are objected to because the component not drawn clearly (figure 1, element 16; where element 16 is directed to an intersection and not a component). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1, 2, 5 – 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wessel et al. (US 6275685) in view of Leyendecker (US 5867065) in further view of Chen et al. (US 5963091).

2. Regarding claim 1, Wessel discloses a device for predistorting a transmission signal to be transmitted over a nonlinear transmission path (figures 4 – 7), comprising: an estimator for determining an error signal depending on the transmission signal and a previously registered transfer characteristic of the nonlinear transmission path (col. 7 lines 4 – 11), where the error signal represents an estimate of an error generated due to the nonlinearity of the transmission path (figure 4 element 60, figure 5, col. 7 lines 13 – 64; where the gain and phase error detectors is being interpreted as the estimator); a time-dispersive element for generating a correction signal by a temporal extension of the error signal (figure 4 element 70, figure 6); and a combiner (figure 4 elements 16, 18) for combining the transmission signal (figure 4 elements 10) and the correction signal (figure 4 elements 92, 94), wherein, due to the temporal extension of the error signal, an error signal segment in the frequency spectrum of a transmission signal transmitted by the nonlinear transmission path is shifted away from the useful frequency range of the signal (col. 5, lines 53 – 60). Wessel is silent about previously registered transfer characteristic and the frequency spectrum is shifted away from the useful frequency range of the signal.

In the same field of endeavor, however, Leyendecker discloses previously registered transfer characteristic (figure 5 element 431, col. 8 line 61 – col. 9 line 34; where the trainer is being interpreted as Wessel's estimator).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use previously registered transfer characteristic as taught by Leyendecker in the system of Wessel to predict the distortion caused by the power amplifier and only train the valid data in the signal providing for better efficiency (col. 9 lines 14 – 51).

Also, in the same field of endeavor, however, Chen discloses the frequency spectrum is shifted away from the useful frequency range of the signal (col. 4 lines 32 – 41).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use the frequency spectrum is shifted away from the useful frequency range of the signal as taught by Chen in the system of Wessel to more efficient modulation providing for better transmission after amplification.

3. Regarding claim 2, Wessel further discloses the nonlinear transmission path is a power amplifier (figure 4 element 22).

4. Regarding claim 5, Wessel further discloses the estimator has an envelope detector for detecting the envelope of the transmission signal (figure 4 element 34), a quantizer for forming quantized envelope values and a table unit for supplying complex distortion coefficients which depend on the quantized envelope values (col 4 lines 38 –

54) and on the previously registered transfer characteristic of the nonlinear transmission path. Wessel is silent about the previously registered transfer characteristic

In the same field of endeavor, however, Leyendecker discloses previously registered transfer characteristic (figure 5 element 431, col. 8 line 61 – col. 9 line 34; where the trainer is being interpreted as Wessel's estimator).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use previously registered transfer characteristic as taught by Leyendecker in the system of Wessel to predict the distortion caused by the power amplifier and only train the valid data in the signal providing for better efficiency (col. 9 lines 14 – 51).

5. Regarding claim 6, Wessel further discloses the estimator also includes a unit for combining the squares of the magnitudes or of the envelope values and the complex coefficients for generating the error signal (col. 7 lines 13 – 64).

6. Regarding claim 7, Wessel further discloses the time-dispersive element is a time-dispersive bandpass filter or low-pass filter (figure 6 element 714, col. 8 lines 27 – 28).

7. Regarding claim 8, Wessel further discloses an adapter (figure 4 element 70) is provided which, on the basis of a signal to be transmitted and an output signal output by a nonlinear transmission path if there is no predistortion (col. 6 lines 34 – 62, col. 10 lines 58 – 62), ascertains the transfer characteristic of the nonlinear transmission path and uses this to control the estimator and/or the filter coefficients of the time-dispersive bandpass filter or low-pass filter (col. 6 lines 34 – 49, and col. 12 lines 19 – 35).

8. Regarding claim 9, Wessel further discloses the adapter ascertains the transfer characteristic at predetermined times (col. 10 lines 25 –63; where  $k$  in  $i.\text{sub}.k$  (col. 10 line 38) is selected yield a predetermined time for the convergence of the adaptive unit found in figure 4 element 70).

9. Regarding claim 10, Wessel further discloses a high-frequency (col. 6 line 9; where a radio frequency band is being interpreted as a high frequency) transmitter comprising: a predistorter for predistorting a transmission signal to be transmitted over a nonlinear transmission path (figures 4 – 7), said predistorter comprising: an estimator for determining an error signal depending on the transmission signal and a previously registered transfer characteristic of the nonlinear transmission path (col. 7 lines 4 – 11), where the error signal represents an estimate of an error generated due to the nonlinearity of the transmission path (figure 4 element 60, figure 5, col. 7 lines 13 – 64; where the gain and phase error detectors is being interpreted as the estimator); a time-dispersive element for generating a correction signal by a temporal extension of the error signal (figure 4 element 70, figure 6); and a combiner (figure 4 elements 16, 18) for combining the transmission signal (figure 4 elements 10) and the correction signal (figure 4 elements 92, 94), wherein, due to the temporal extension of the error signal, an error signal segment in the frequency spectrum of a transmission signal transmitted by the nonlinear transmission path is shifted away from the useful frequency range of the signal (col. 5, lines 53 – 60);  
a power amplifier for amplifying a transmission signal which has been predistorted by the predistorter (figure 4 element 22); and a bandpass filter which succeeds the power

amplifier (figure 6 element 714, col. 8 lines 27 – 28) and whose transmission band is adjusted to the useful frequency range of the transmission signal (col. 5, lines 53 – 60). Wessel is silent about previously registered transfer characteristic and the frequency spectrum is shifted away from the useful frequency range of the signal.

In the same field of endeavor, however, Leyendecker discloses previously registered transfer characteristic (figure 5 element 431, col. 8 line 61 – col. 9 line 34; where the trainer is being interpreted as Wessel's estimator).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use previously registered transfer characteristic as taught by Leyendecker in the system of Wessel to predict the distortion caused by the power amplifier and only train the valid data in the signal providing for better efficiency (col. 9 lines 14 – 51).

Also, in the same field of endeavor, however, Chen discloses the frequency spectrum is shifted away from the useful frequency range of the signal (col. 4 lines 32 – 41).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use the frequency spectrum is shifted away from the useful frequency range of the signal as taught by Chen in the system of Wessel to more efficient modulation providing for better transmission after amplification.

10. Regarding claim 11, the steps claimed as method is nothing more than restating the function of the specific components of the apparatus as claim 1 above and



therefore, it would have been obvious, considering the aforementioned rejection for the apparatus claim 1.

11. Regarding claim 12, Wessel discloses a method for spectrally forming an interference spectrum of a transmission signal at the output of a power transmitter (col. 3 lines 11 –20), said method comprising the steps of: generating an error signal from the transmission signal (figure 4 elements 82, 84) and a previously registered transfer characteristic of a power amplifier, wherein the error signal represents an estimate of an error generated due to a nonlinearity of the power amplifier (figure 4 element 60, figure 5, col. 7 lines 13 – 64; where the gain and phase error detectors is being interpreted as the estimator); effecting a temporal extension of the error signal to generate a correction signal; combining the correction signal and the transmission signal to generate a predistorted transmission signal (figure 4 elements 10, 16, 18, 92, 94), wherein , due to the temporal extension of the error signal, an error signal segment in the frequency spectrum of a transmission signal transmitted by the power amplifier is shifted away from the useful frequency range of the transmission signal (col. 5 lines 53 – 60); and feeding the predistorted transmission signal (S1') into the power amplifier. Wessel is silent about a previously registered transfer characteristic (figure 4 element 22).

In the same field of endeavor, however, Leyendecker discloses a previously registered transfer characteristic (figure 5 element 431, col. 8 line 61 – col. 9 line 34; where the trainer is being interpreted as Wessel's estimator).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use previously registered transfer characteristic as taught by

Leyendecker in the system of Wessel to predict the distortion caused by the power amplifier and only train the valid data in the signal providing for better efficiency (col. 9 lines 14 – 51).

12. Regarding claim 13, Wessel further discloses the step of performing bandpass filtering of an output signal output by the power amplifier (figure 4, elements 22, 24, 26, 50, 52, 54, 60, 82, 84, 70; figure 6 elements 82, 84, 714, 744; col. 8 lines 27 – 28)

13. Claims 3, 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wessel et al. (US 6275685) in view of Leyendecker (US 5867065) in further view of Chen et al. (US 5963091) in further view of Cavers (US 5049832).

14. Regarding claim 3, Wessel discloses the estimator has a unit for forming the squares of the magnitudes of the transmission signal to be transmitted and a table for supplying complex distortion coefficients (col. 10 lines 25 – 67), which depend on the squares of the magnitudes and on the previously registered transfer characteristic of the nonlinear transmission path (col. 7 lines 4 – 11). Wessel does not disclose a unit for forming the squares of the magnitudes and a table depend on the squares of the magnitudes (Leyendecker does mention a least squares method which is a sum of the squares: col. 14 lines 24 – 25).

In the same field of endeavor, however, Cavers discloses a unit for forming the squares of the magnitudes and a table depend on the squares of the magnitudes (figure 5, col. 7 line 58 – col. 8 line 15).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use a unit for forming the squares of the magnitudes and a table

depend on the squares of the magnitudes as taught by Cavers in the system of Wessel to provide an estimate of the power of the noise in the signal.

15. Regarding claim 4, Wessel discloses the unit for forming the squares of the magnitudes of the real (col. 10 lines 25 – 33) and the imaginary part of the transmission signal is provided. Wessel is silent about the imaginary part of the transmission signal is provided.

In the same field of endeavor, however, Cavers discloses the imaginary part of the transmission signal is provided (col. 3 lines 30 – 37).

Therefore it would have been obvious to one skilled in the art at the time of invention was made to use the imaginary part of the transmission signal is provided as taught by Cavers in the system of Wessel to allow for modulation of the signal for efficient transmission.

#### ***Other prior art cited***

The prior art made of record and not relies upon is considered pertinent to applicant's disclosure.

16. Ichiyoshi (US 5699383) discloses a high power transmitter with I and Q channels, complex multiplier, error detector, envelope detector, controller, digitizer, up-converter, QAM modulator, and a power amplifier (figure 1).

#### ***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aslan Ettehadieh whose telephone number is (571) 272-8729. The examiner can normally be reached on Monday - Friday, 8:00am - 4:30pm.

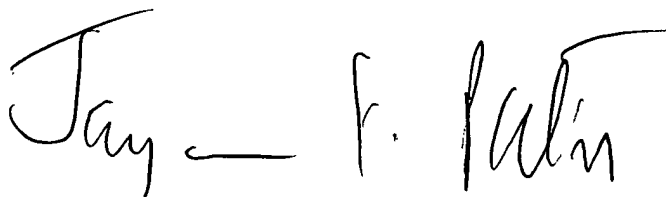
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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on (571) 272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Aslan Ettehadieh  
Examiner  
Art Unit 2637

AE

A handwritten signature in black ink, reading "Jay K. Patel". The signature is written in a cursive, flowing style. The first name "Jay" is followed by a horizontal line, then "K.", and finally "Patel".

**JAY K. PATEL**  
**SUPERVISORY PATENT EXAMINER**